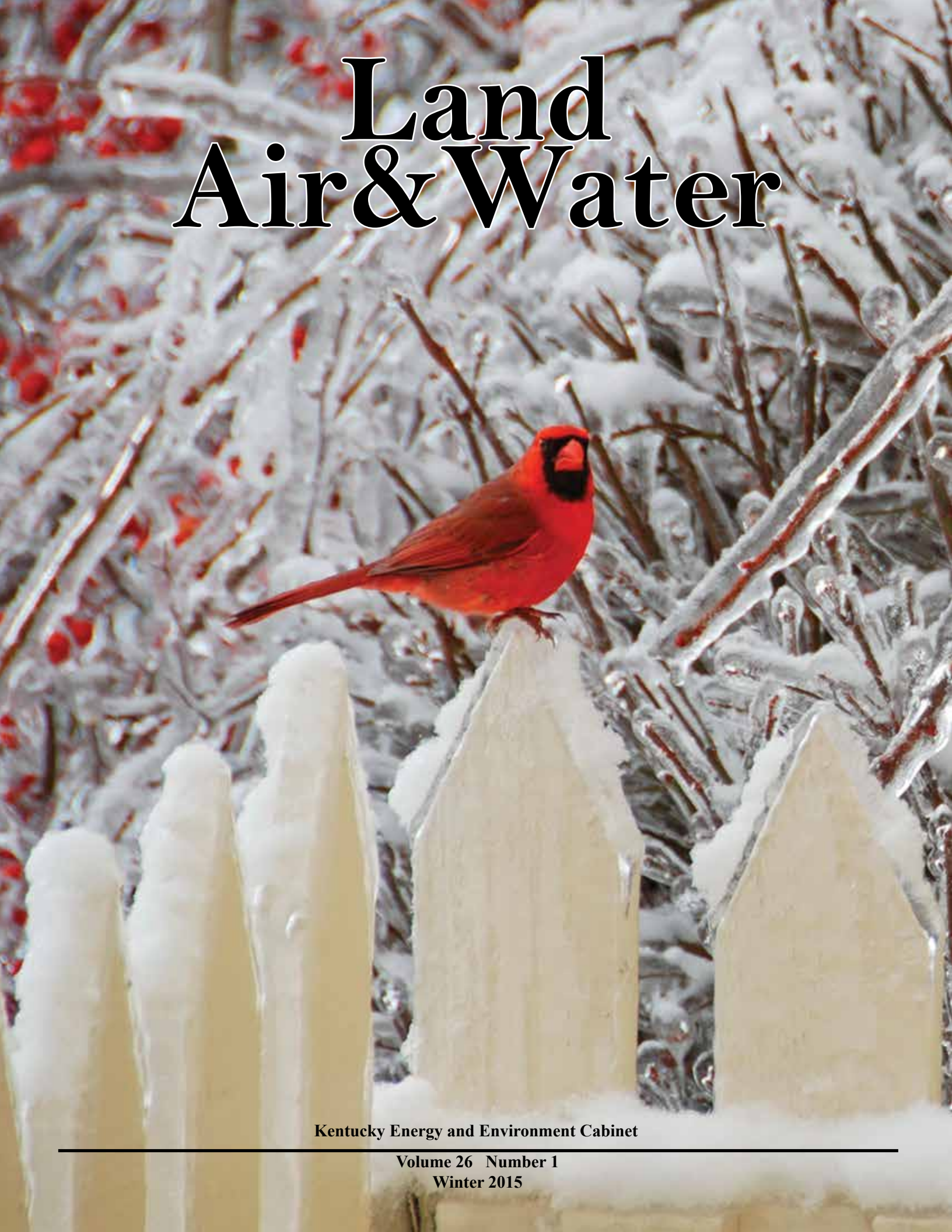
Land Air & Water



Kentucky Energy and Environment Cabinet

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Land Air&Water

since 1988

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From the Secretary's Desk

As we enter 2015, I wanted to take some time to reflect on the year behind us and also mention a few items that we are going to be involved with in the new year.

First, however, I want to give a heartfelt thanks to all of the employees of the Energy and Environment Cabinet. I never cease to be amazed by so many dedicated, intelligent, and creative people in one organization. I think the stories in this and previous issues of *Land, Air and Water* demonstrate these and other qualities of our EEC family. You go beyond what is called on you to do—you reach out to our citizens, business and industry, local governments, other state agencies, schools and universities to help them find ways to promote sustainable and environmentally sound practices. You do this on a daily basis, and I commend you for your energy and enthusiasm.

In looking back at the last year, 2014 could be viewed as the year of 111(d)—a key component of President Obama's Clean Power Plan to reduce carbon dioxide emissions from existing power plants. The Environmental Protection Agency (EPA) proposed the rule in June 2014; about 20 people within EEC helped review and write comments on the 700-plus page proposal and associated documents. We submitted the comments a little ahead of the Dec. 1 deadline—you can read them at http://tinyurl.com/kef5e4u. I very much appreciate the work of the EEC personnel who committed their time and expertise reviewing the proposal and drafting comments.

As I've said a number of times, the rulemaking represents the most significant energy and environmental policy in more than 40 years. The proposed rule is unprecedented to the extent it delves into energy policy. As such, we and many of our stakeholders are concerned about the potential economic impacts to Kentucky. We accept the need to address carbon dioxide emissions, but we must do so in a way that does not burden our citizens with higher electricity costs. The proposal on its face is all about encouraging lower or zero emissions energy sources, but the likely outcome of the rule, if left as proposed, would be to move the U.S., including Kentucky, to an untenable reliance on natural gas for electricity generation. From our perspective, that is not sound energy policy and it is not sound environmental policy.

During any given year, there will be events we look back on with pride and others we will look back on with misgivings. 2014 was no different. In the EEC, there were a number of notable achievements, some of which have been covered in this magazine. One big success was our ability to begin the process of constructing the final cap on the Maxey Flats Nuclear Disposal Facility near Morehead. The cleanup on this site has been ongoing for more than 30 years, and I want to thank the staff within the Department for Environmental Protection for their perseverance on this issue.

I am also particularly proud of those activities that demonstrated partnership and collaboration. One of these is the Energy Star program for schools. Importantly, we have had the active participation of the Kentucky School Boards Association to grow a program that had only 12 Energy Star qualified schools in 2009 to more than 270 today. Energy efficiency will only grow in importance in the coming years, and if the Energy Star program for schools is indicative of progress, the possibilities are very positive.

We are looking forward to more school dedications in 2015. We are also looking forward to the second year of our 20/20 Vision for Reforestation—an initiative that depends on the volunteer support of the Scouting troops, 4-H'ers and others to help us plant tree seedlings, with the goal of planting 20 million trees over 20 years.

I want to close by saying thank you again to the employees of EEC, and to wish everyone a safe and happy New Year.

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Our Cover

Known for being territorial birds, a male Cardinal perches on a fence in the icy yard of artist and photographer Donna Forgacs of Danville.

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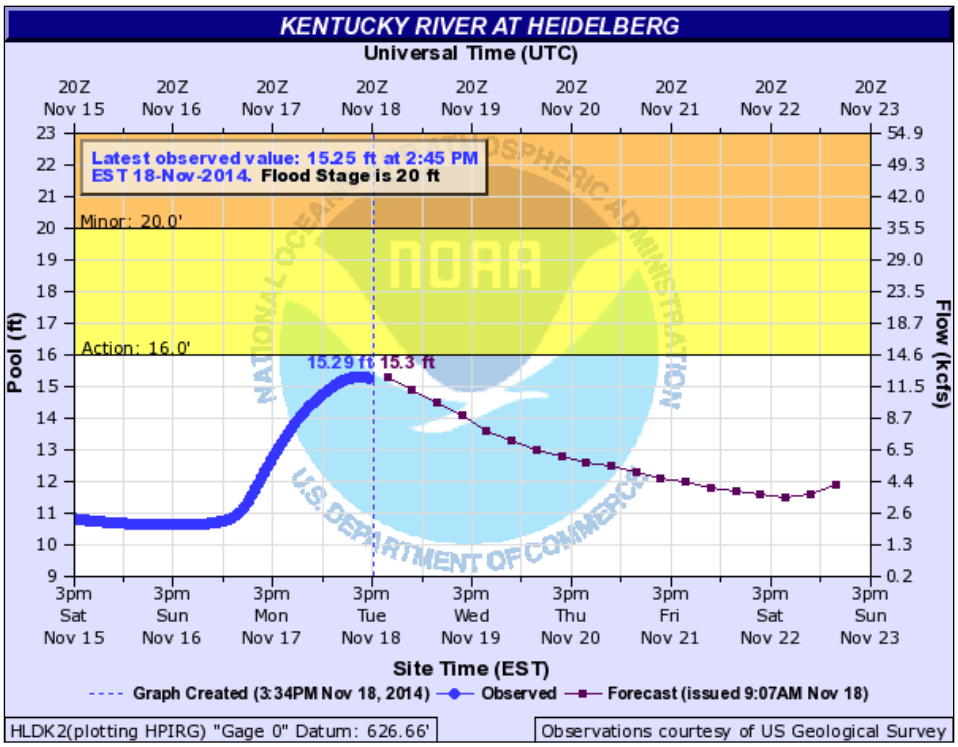
Gaging Kentucky's water resources

By Bill Caldwell
Division of Water

USGS Stream Gage Network provides data essential for flood forecasting, water quality and protection, and recreation

More than 5,000 years ago, the ancient Egyptians developed a system of measuring the annual flooding of the Nile River Delta. Using devices called nilometers, the Egyptians kept track of the height of the floodwaters each year and developed relationships between annual flooding and crop yields in the delta. With this knowledge they were able to predict the potential for each year's harvest and also maintain surplus stores of grain from the good years to carry them through the lean years. A modern stream gage is still based on the age-old principle that understanding how our water resources function is key to being able to use them properly for our benefit.



LEFT: ***Depiction of an ancient Egyptian nilometer. The central column measured the height of water during the annual flood of the Nile River.*** Courtesy of CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0/)], via Wikimedia Commons **ABOVE:** ***Forecasting hydrograph for the Kentucky River at Heidelberg shows the current gage height of the river's water surface and forecasted gage height.*** Courtesy of the NWS Advanced Hydrologic Prediction Service

The U.S. Geological Survey (USGS) started its first stream gage in 1889 on the Rio Grande River in New Mexico to help answer a question—is there enough water for irrigation purposes to encourage new development and western expansion? Since that time the number of stream gages in the U.S has grown to nearly 9,000 spread across all 50 states. These gages provide the data that is used by a large number of public and private users to guide decisions on such things as water supply, hydropower, flood control, flood and drought monitoring and forecasting, water quality and protection, academic research, highway and bridge design, navigation and recreation.

Here are just a few examples of the benefits that Kentucky citizens derive from USGS stream gages.

Avoiding Disaster: Flood Hazard Mapping and Flood Forecasting

In 1793 as flood waters lapped at the lower plain of the young town of Cincinnati, the settlers were concerned about how high the water might eventually rise. After consulting with their Native American neighbors, the settlers were directed to a tree that marked a major flood 20 years earlier, providing the settlers an opportunity to move to a safe distance away from the river. A simple mark on a tree seems crude by modern standards, but local "gages" like these are the precursors to the network of stream gages that we rely on today.

The National Weather Service (NWS) uses streamflow data to issue flood forecasts and warnings on a real-time basis for several flood-prone locations in Kentucky. Using sophisticated hydrologic modeling capabilities, flood warnings issued by the NWS are a critical part of community responses to flooding, providing sufficient lead time to implement emergency response plans and, if needed, evacuations where flooding is imminent. According to NWS Hydrologist Mike Callahan, the combination of good science and accurate streamflow data is critical to accurate and timely flood forecasting.

"In the past, the lack of data and science limited people to guess how high the water would rise just by looking at the trend of one gage," said Callahan. "Today, with good streamflows, precipitation and

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LEFT to RIGHT: ***Michael Martin of Boy Scout Troop 56 holds juvenile mussels ready to be placed in silos that he and his fellow Scouts built for Marsh Creek.*** Pam Martin photo ***An 18-year-old Cumberland elktoe from Marsh Creek.*** Jacob Culp photo ***Marsh Creek once supported the most diverse freshwater mussel fauna in the Cumberland River.*** Sue Bruenderman photo ***Joe Metzmeier and Pam Martin of the U.S. Forest Service check silos in Marsh Creek.*** Eugenia Jones photo

Freshwater mussels—natural indicators of water quality

Bivalve restoration is goal of Marsh Creek Basin Work Group

By Sue Bruenderman
Division of Water

Once upon a time, in a small mountain stream named Marsh Creek in McCreary County, Ky., above Cumberland Falls, there lived a small freshwater mussel called the Cumberland elktoe. This thin-shelled bivalve species, which grows to about 3.5 inches in length and just over an inch in height, was never very common. It is found only in the upper Cumberland River system in southeast Kentucky and northcentral Tennessee. Its population and distribution was naturally limited by the 85-foot falls, as well as the harsh environmental conditions characteristic of streams above the falls. Despite these limitations, the Cumberland elktoe adapted to the calcium-limited (essential for shell development) and food-limited waters of Marsh Creek, burrowing into small pockets of sand and mud amidst Cambrian-aged sandstone rocks and boulders.

Today, the Cumberland elktoe is officially listed as endangered by the U.S. Fish and Wildlife Service (USFWS). The species, along with six other mussels, has all but disappeared from Marsh Creek.

Freshwater mussels, like the Cumberland elktoe, are excellent indicators of environmental quality and have ecological ties with fish to complete their life cycle and colonize new habitats. As filter-feeders, they can help improve both water quality and clarity, and they are an important part of the aquatic food web. Major disturbances like excessive erosion and contamination of the water stress them, which can change their behavior, smother their living spaces, clog their gills, and seriously alter or ruin their ability to swim, burrow, breathe, feed and produce offspring. This is especially true for long-lived mussels, which can spend their entire lives in a single pocket of sand, and for the Cumberland elktoe, that means up to 30 or 40 years.

In 2011, in response to the catastrophic decline of the Marsh Creek mussel fauna, various biologists from the Kentucky State Nature Preserves Commission (KSNPC), Kentucky Division of Water, U.S. Forest Service, USFWS and the Kentucky Department of Fish and Wildlife Resources (KDFWR) formed the Marsh Creek Basin Work Group and developed a study plan to identify problems associated with mussel decline and to look for solutions to help re-establish them.

Over a period of two years, the group sampled fish, aquatic bugs, mussels, surface water and stream bottom materials (sediment), assessing the habitat in Marsh Creek and many of its tributaries and measuring the overall health of their populations. The information collected indicates acid mine drainage has harmed their populations in the upper reaches of Marsh Creek.

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Residential wood heating getting cleaner

EPA standards to address pollution from new wood burning appliances

By Roberta Burnes
Division for Air Quality

An outdoor wood boiler, or hydronic heater.
Photo by Roberta Burnes

This winter, the U.S. Environmental Protection Agency (EPA) is scheduled to update rules under the Clean Air Act that will significantly reduce fine particle pollution from new wood burning appliances. The new rules, known as New Source Performance Standards (NSPS), do not apply to existing appliances already in use.

It's been 25 years since the EPA last issued a rule to reduce smoke pollution from wood stoves. Since that time, advances in technology have spurred the development of new wood heating appliances and better ways to reduce emissions from those appliances. So perhaps it's not surprising that the new standards have been greeted with attention and, in some cases, confusion.

We sat down with EPA's Environmental Scientist David Cole to find out what the wood heat standards are expected to mean—and not mean—for homeowners.

Q: Why the concern over wood smoke?
DC: *Smoke from residential wood heaters contains fine particle pollution, also known as fine particulate matter or $PM_{2.5}$, along with other pollutants including carbon monoxide, volatile organic compounds (VOCs), black carbon and air toxics such as benzene. Smoke from residential wood heaters, which are used around the clock in some areas, can increase particle pollution to levels that pose serious health concerns. In some areas, residential wood smoke constitutes a significant portion of the fine particle pollution problem.*

Q: I have a wood burning stove in my home. Will the new standards apply to my stove?
DC: *No. The new standards will not affect existing woodstoves and other wood-burning heaters currently in use in people's homes, but only affect stoves that are manufactured after the rule becomes final. The rule also would not apply to outdoor fireplaces, pizza ovens, barbecues or chimineas and would not apply to new or existing heaters that are fueled solely by oil, gas or coal. In addition, the proposal would not prohibit or restrict the use of wood-burning appliances for residential heating.*

Q: What wood burning appliances are covered under the new standards?
DC: *EPA first issued regulations for residential wood heaters in 1988. That rule applied only to adjustable burn-rate wood stoves (including a type of adjustable burn-rate wood stove known as a fireplace insert). Since that time, the technology for reducing emissions from wood heaters has significantly improved and now is available to make a range of wood heaters more efficient and less polluting. The proposed standards cover newly manufactured adjustable-rate wood stoves, pellet stoves, wood-fired hydronic heaters, forced-air furnaces, masonry wood heaters, and a type of previously unregulated wood stove known as a "single burn-rate" stove.*

Q: What about fireplaces and fireplace inserts?
DC: *Fireplace inserts actually are adjustable burn-rate wood stoves. These inserts are currently regulated under the 1988 rule, and will continue to be in the new rule. EPA did not propose to include fireplaces because fireplaces are not effective heaters and so they would not be subject to the rule. Fireplaces are included*

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Attention Kentucky high school artists

By Mary Jo Harrod
Division of Compliance Assistance

If you are a Kentucky high school student artist, we challenge you to demonstrate your creativity. The Kentucky Department for Environmental Protection (DEP) is soliciting nominations for its 2014–15 Eco-Art Contest.

This popular contest provides an opportunity for students to gain statewide recognition for their artwork as it relates to Kentucky's environment. Used as a tool for environmental education, art supports DEP's mission to protect Kentucky's environment.

Multiple awards will be presented to eligible Kentucky high school students who create art using the contest themes or categories of conservation, pollution prevention and environmental protection. Students may submit artwork using the media types of drawing/painting/print, mixed media, sculpture and photographs. One winner will be chosen for each art type in each category.

"We are asking students, our future leaders, to use their art to educate and inspire others to protect our environment for now and the future," said R. Bruce Scott, DEP commissioner.

Artwork from previous years' contest winners is displayed in the DEP Training Center in Frankfort, where it has been viewed by hundreds of visitors. Winning artwork and the artists from the 2013-14 contest may be seen at http://tinyurl.com/mdgvb8t.

Contest nominations are being accepted until close of business Feb. 27, 2015. All nominations must be sent via email to envhelp@ky.gov. A digital picture of each artwork nomination must accompany each form submitted. Eligible students include all students enrolled in Kentucky public and private high schools for the 2014–15 academic year. Winners will be notified in March. For more information about the Eco-Art Contest and to access a nomination form, visit http://dca.ky.gov/LGGS/Pages/ecoart.aspx.

Freshwater mussels

Continued from Page 2

These waters are naturally acidic and aquatic animals have adapted to the poorly buffered waters over the millennia. However, extensive coal mining that occurred through the 1980s was a considerable land disturbance in the narrow valley of Marsh Creek. Minerals and heavy metal salts released by abandoned or poorly reclaimed coal mines in headwater reaches increased the total acidity of the water. This, in combination with the poorly buffered waters, was not exactly favorable for the Cumberland elktoe and its comrades.

Previously, survey work conducted by the KSNPC in the late 1980s also identified an unreported oil spill that killed at least 500 Cumberland elktoe and other mussels in Marsh Creek near the Kidd School Road crossing in the middle portion of the watershed. Last year, high levels of oil and grease remain as evidenced in the river bottom sediment analyzed at this and other locations downstream. Another known, continual and significant problem is excessive siltation, as well as urban development, organic enrichment from sewage, and excessive nutrient input stemming from poor agricultural practices.

The study does, however, include some good news. Many of the small tributaries feeding directly into Marsh Creek still have excellent water quality, even in the most polluted uppermost reaches, fostering hope that one or more places can serve as a mussel refuge as the work group continues to identify the most significant causes and sources contributing to mussel decline.

"As a McCreary County native, I'm pleased the various agencies are working together to determine the reasons behind the drastic decline of our mussel population," said resident Eugenia Jones. "Hopefully, this will lead to a successful plan of action which will correct problems and allow our mussels to once again thrive in the Marsh Creek watershed area. Since mussels are such excellent indicators of water quality, their restoration and ability to survive in Marsh Creek will be of great value to our local residents and wildlife."

In July 2013, KDFWR placed artificially-raised juvenile pocketbook mussels in concrete "mussel silos" at nine study sites in Marsh Creek, Indian Creek and several larger tributaries feeding Marsh Creek to test for survival and growth. After nine months, and despite vandalism, many of the pocketbook mussels were still alive. A second set of a more sensitive species, the wavy-rayed lampmussel, were deployed in May 2014 and retrieved four months later in September. Very few live mussels were recovered. Vandalism and beaver activity were a problem but do not fully explain the differences in survival rates between the two study periods. The work group hopes to conduct additional studies in 2015 that will answer these and other remaining questions about the overall health of Marsh Creek.

"Never before have we been so aware of the necessity of clean water and healthy waterways," said Sunni Carr, wildlife diversity coordinator with KDFWR. "Therefore, our responsibility for maintaining, restoring, and caring for watersheds is paramount. As an agency, Kentucky Fish and Wildlife considers the opportunity to raise freshwater mussels and to help monitor and restore populations a great responsibility. We hope that our efforts, along with our partners, are sufficient to allow future generations a great foundation for ecological recovery and management."

Juvenile wavy-rayed lampmussels that were placed in silos. Pam Martin photo

Fort Campbell landfill property imagery courtesy of Google Earth.

Landfill to solar power

Fort Campbell takes a unique step towards energy security, utilizes renewable energy on landfill acreage

By Kenya Stump
Department for Energy Development and Independence

By the end of 2015, Fort Campbell will be home to the largest solar array in Kentucky, coming in at 5 megawatts (MW). This solar project is a long time in the making and one that resulted in a unique partnership between Pennyrile Rural Electric Cooperative (PRECC), Kentucky Department for Energy Development and Independence (DEDI), the federal U.S. Department of Energy, U.S. Army and Fort Campbell.

What makes this project unique, aside from the partnership between state, federal and private organizations, is that the project will be located on a 30-acre parcel of previously unusable landfill space.

The landfill was selected for the project due to its size, age, orientation and proximity to the PRECC electrical substation. In total, Fort Campbell has more than 300 acres of unused landfill space. This will not only be the largest solar project in Kentucky, but it will be the first solar project built on a landfill, creating a learning opportunity for other developers looking at landfills and other brownfield properties (see sidebar) as potential sites for renewable energy projects.

The idea to reduce Fort Campbell's dependence on fossil fuels isn't new. In fact, it originated more than two years ago through its own renewable energy plan, spurred in part by the efforts of the U.S. Department of Defense (DoD) back in 2005. The Energy Policy Act required every federal agency to source at least 5 percent of its energy consumption from renewables in fiscal year 2012; the DoD nearly met the goal at 4 percent. In 2013, the goal rose to 7.5 percent and is now set at 20 percent by 2020 according to President Obama's Climate Action Plan. To further re-enforce those goals, the

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Seven reasons to consider a brownfield for your renewable energy project

By Herb Petitjean
Division of Compliance Assistance

Many developers shy away from obtaining brownfield properties like closed factories, old service stations, former dry cleaners, abandoned hospitals, schools or mined lands due to the possibility of real or perceived contamination and environmental concerns. However, these properties often have features that make them ideal for renewable energy projects. Consider the following:

1. Brownfield properties often have existing infrastructure, such as utilities, roads, rail sidings and loading docks, remaining from previous operations.
2. Resistance from neighbors is less prevalent for cleanup and redevelopment of brownfields compared to new construction on undeveloped fields or woodlands. Zoning issues are also less likely to occur.
3. Communities with brownfields may have an available workforce due to the closing of previous operations. Local governments may be more supportive in order to replace lost jobs.
4. Some brownfield properties can be quite large, resulting in less difficulty with assembling adequate acreage.
5. Environmental issues can limit the possible uses of brownfields, but they can allow developers to obtain them at a lower cost than similar-sized greenfields.
6. Brownfield incentives are often available to combine with other incentives to help make these projects successful.
7. Recycling brownfields is more sustainable than constructing on greenfields. For a "green" company, this demonstrates a commitment to operate in an environmentally responsible manner.

For whatever type of project you're planning—an ethanol plant, a solar water heater factory, retail biodiesel station or switchgrass farm—there may be a suitable brownfield waiting. The Kentucky Brownfield Program can assist you in finding and redeveloping these properties. Email herb.petitjean@ky.gov, call 800-926-8111 or visit http://dca.ky.gov/brownfields/Pages/default.aspx.

Kentucky industries generate efficient electricity through CHP

Articles by Eileen Hardy
Department for Energy Development and Independence

Every day, more than 4,000 manufacturing facilities in Kentucky transform raw materials into usable products for consumer or industrial use. Manufacturing is Kentucky's greatest source of revenue and leading source of employment. Manufacturing is also a major consumer of energy, with intensive processes such as aluminum smelting, paper milling and chemical production. Although energy costs vary by electric utility, and electricity intensity varies by industry, Kentucky reports that nearly half of the energy consumed in 2013 was used for manufacturing processes.

Historically, Kentuckians have benefited from secure, low-cost electricity. Today, however, the energy landscape is rapidly changing to meet new production demands and environmental regulations. Kentucky's manufacturing sector is also faced with challenges to reduce energy costs and carbon emissions and to stay competitive.

To address the needs of Kentucky's manufacturing and industrial businesses, the Energy and Environment Cabinet (EEC) launched a two-year initiative to promote combined heat and power (CHP) technology to decrease environmental impacts, provide energy security and reduce energy costs.

CHP, also known as cogeneration, generates electricity and heat from a single fuel source, such as natural gas or renewable biomass. The generated heat, or thermal energy that otherwise would be lost, is captured to power another process such as climate control in buildings, hot water or for an industrial process. CHP systems are located on-site or near the facility using the electrical power; they can either supplement or replace other means of generating the heat and power. CHP also can be used as a means of managing demand charges on a facility's electric bill.

A boiler at Domtar in Hawesville that produces steam to generate electricity. Photo by Domtar

Kentucky's CHP program is a public/private partnership between the Department for Energy Development and Independence, Kentucky Pollution Prevention Center (KPPC) and Kentucky Association of Manufacturers. Additional resources are provided by the Southeast Combined Heat and Power Technology Assistance Partnership, a voluntary program established by the U.S. Department of Energy. The program educates manufacturers about CHP and helps them evaluate the suitability of CHP at their facility. It offers a limited number of technical screenings and assessments that consider the heat and electrical demands of the facility and a range of other economic factors to determine if CHP is right for a given facility. It is funded by a $195,000 grant from the U.S. Department of Energy.

"Kentucky's manufacturing sector is an important economic driver, employing nearly 230,000 citizens," said EEC Secretary Len Peters. "In the wake of rising energy prices and pending regulation of greenhouse gas emissions, CHP technology is a viable option for

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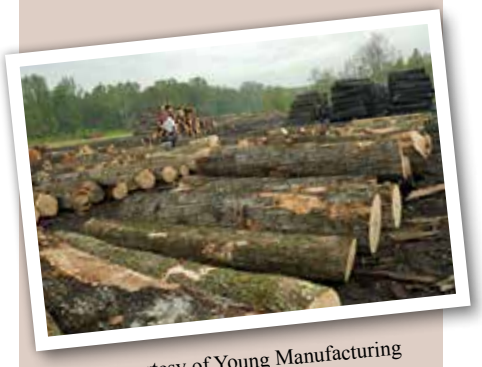

Photo courtesy of Young Manufacturing

Young Manufacturing: a convergence of old concepts with modern technology

To say that woodworking has been in the Young family's blood could be an understatement. The Young family ancestors began running hardwood lumber as far back as 1858. In 1948, C.T. Young began manufacturing stair treads with only three employees.

Located in Beaver Dam, Young Manufacturing is situated on a 55–acre tract of land and is the largest oak millwork company in Kentucky. Today, the business comprises 200 employees and a full line of millwork, exterior door sills, door frames and a lot of innovation.

Part of that innovation occurred in 1976 when Young realized that his wood scraps from the milling process were a great fuel source and could be used to provide electricity to his operations. Young refers to his idea as the biomass steam/electrical plant, which is commonly known as a combined heat and power (CHP) operation. In fact, it is one of the earliest ones in Kentucky, proving that sometimes there's nothing wrong with an old concept brought to life in a modern way.

In essence, Young Manufacturing burns wood scraps in a steam boiler where the steam is then used to create electricity

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Gaging Kentucky's water resources

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modeling, we are pretty accurate out to three days on the larger rivers."

Flood hazard mapping studies are used by the Federal Emergency Management Agency (FEMA) to establish flood risk zones as part of the National Flood Insurance Program. Historical peak flow data provided by USGS stream gages are critical to the development of flood frequency curves that help to define areas that lie within the 1 percent annual chance floodplain (a flood that has a 1 percent probability of occurring in any given year, also referred to as a 100-year flood). Armed with this information, communities are better equipped to make decisions that manage flood risk by limiting or avoiding development in flood prone areas.

Living Within Our Means: Water Withdrawal and Wastewater Management

In 2010, USGS estimated that the amount of water withdrawn and used in the U.S. was about 355 billion gallons per day. It's hard to put such a large number into perspective, but imagine the entire flow of the Ohio River as it drains into the Mississippi River on an average day—and then double it. By anyone's standard that is a lot of water, and care must be taken to ensure that streams continue to function as a healthy natural system in spite of the demands that are placed on them.

Stream flow data is essential to properly manage both the quantity and quality of our rivers and streams. The Kentucky Division of Water uses historical streamflow data to set limits on water withdrawals and wastewater discharges into the state's waters. Historical records are useful for studying the variable flow of a stream over time and setting reasonable limits that minimize adverse impacts to the resource when flows are below normal during times of drought.

"The USGS stream gage network enables us to be good stewards of our water resources," said Chris Yeary, supervisor of water quantity management for the Division of Water. "Without it we could not effectively manage a water withdrawal permitting and reporting program for the nearly 1 billion gallons of water withdrawn each day by the regulated community."

Enjoying the Outdoors: Water Sports

Canoeing, kayaking, fishing and boating. Recreational users are a rapidly growing group who can take full advantage of the continuous, real-time capabilities of the stream gage network. The optimum water conditions for a whitewater rafter differ from those wanting a leisurely day trip in a canoe. USGS stream gages provide information that allows users to make decisions about whether stream conditions are safe and/or opportune for their preferred recreational activities.

Quality Records for More Than A Century

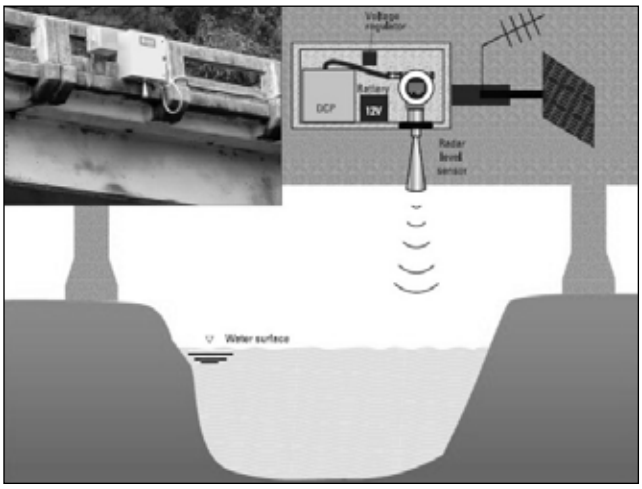
The USGS Stream Gage Network has been providing high quality streamflow records to the nation for 125 years. The first stream gages in Kentucky at Cumberland Falls and Lock 10 of the Kentucky River are now in their 107th year of operation.

How is streamflow measured?

A stream gage provides two important pieces of information—the stage and the discharge. The actual gage provides a continuous measurement of the stage, or gage height, of the surface of a river or stream relative to some fixed reference elevation. Discharge, or streamflow, is determined from physical measurements of the stream channel and stream velocity and is used to calculate the rate at which water is flowing at that point in the stream, usually expressed in cubic feet per second.

After a series of stage and discharge measurements are made, a graphical relationship is generated so that the discharge can be determined by measuring the stage.

The USGS stream gages transmit stage data to a central database via satellite every 15 minutes where the data is processed and then provided to the end user via the Internet. In this way, near real-time streamflow data can be accessed at more than 140 locations in Kentucky.



A state-of-the-art stream gage measures the height of the water surface relative to a reference elevation using radar. Inset shows a stream gage attached to a bridge. Courtesy of the USGS in Louisville

Kentucky's network has grown to include more than 140 stream gages that continuously monitor streamflow and make that data available on a real-time basis. Year after year, these stream gages add to a historical record that defines the natural limits and extremes of our water environment. This in turn serves to place limits on our own expectations as we manipulate and manage our water resources. An ancient Chinese proverb says "when you drink the water, remember the spring."

For 107 years and counting, the USGS Stream Gage Network in Kentucky has been on the job doing just that. For more information, visit http://waterwatch.usgs.gov/new/?id=ww_current. For forecasts for rivers and streams across the U.S. visit http://water.weather.gov/ahps/ .

Kentucky industries generate efficient electricity through CHP

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Kentucky's industries to reduce emissions associated with energy consumption, freeing up resources to reinvest in manufacturing jobs and remain competitive in the workplace."

Through education and outreach opportunities, Kentucky's program partners anticipate seeing a greater increase in CHP participation. Last year, stakeholders from the manufacturing, utility, and other public and private sectors attended meetings to identify technical, policy and financial barriers to using CHP. Industry leaders also have an opportunity to access the application of CHP technology in their facilities by using a series of screening tools and on-site assessments. Ultimately, an action plan will be developed to identify strategies that benefit industrial and institutional CHP end-users, ratepayers and utilities.

"The KPPC provides technical assistance through no-cost feasibility assessments to industrial and commercial facilities throughout the state to see if they could benefit by installing a CHP system," said KPPC Acting Director Lissa McCracken. "Alongside other program partners, we organize education and outreach opportunities aimed at Kentucky facilities to promote the environmental and economic benefits of CHP."

"When we assess a commercial facility for suitability for a CHP system, we look at a number of factors," said Cheryl Eakle, KPPC sustainability engineer. "We find that well-suited facilities will generally have higher thermal loads, consistent electric and thermal energy requirements, and round-the-clock operations."

CHP systems can be deployed in existing and new facilities and can be sized to meet energy demand loads of a variety of sizes. These systems can be great investments and provide tremendous benefit when appropriately designed for a local need.

"This is a proven technology and there have been a number of advances in reciprocating engines and smaller combustion turbines with capacities, starting at 25 kilowatts, which now make it feasible for smaller, single-building users to take advantage of CHP technology," noted Eakle.

Eight Kentucky companies have adopted CHP technology and use a variety of fuels, including biomass, waste heat and natural gas. Last year, CHP projects in Kentucky reduced electricity generation by 635 gigawatt-hours, which is the equivalent electricity requirements of 46,276 homes. This amount of energy effectively reduced emissions by 652,000 tons of carbon dioxide, 600 tons of nitrous oxides and 1,330 tons of sulfur dioxide from Kentucky's 2014 electricity generation.

In Hawesville near the Ohio River in Daviess County, Domtar has had a CHP project at its paper pulp mill since 2001. It produces 75 percent of the electricity it uses by recovering byproducts from its production process. Three boilers produce steam that is used to generate electricity. One boiler is fueled by the tree bark and sawdust the plant does not use. The other two are powered by chemical recovery in which the byproduct compounds from wood cooking are recycled and produce 'green' steam. Renewable sources produce 96 percent of the steam, and fossil fuels are used only when the boilers are started up or during brief shutdowns.

Nationwide, the EPA estimates 88 percent of existing CHP capacity is found in industrial applications where CHP could provide electricity and steam to energy-intensive industries such as chemicals, paper, refining, plastics and metals manufacturing. CHP in commercial and institutional applications accounts for 12 percent of existing capacity, providing electricity, steam and hot water to buildings such as hospitals, schools, university campuses and hotels. Reliable power is critical for hospitals and emergency service providers during natural disasters or other grid interruptions. CHP can be utilized to ensure access to reliable electricity.

"Energy management and the implementation of highly efficient technologies, such as CHP, are critical to Kentucky reaching its goal of offsetting at least 18 percent of the projected 2025 energy demand through efficiency, as outlined in the governor's strategic action plan," concluded Peters.

To learn more about Kentucky's CHP program, visit http://energy.ky.gov/Programs/Pages/chp.aspx or visit the EPA's CHP web page at http://www.epa.gov/chp/index.html.

Young Manufacturing: a convergence of old concepts with modern technology

Continued from Page 6

through a turbine. The resulting heat from the turbine is captured and used for the wood kilns that dry the lumber. The CHP units provide 65 percent of the company's total electrical energy needs and 100 percent of the heat energy required at the facility. This means Young Manufacturing is conserving about 10 million BTU's/hour in fossil fuels with captured heat load in the facilities.

Young Manufacturing processes more than 60 million pounds of lumber and raw materials annually, or enough to build 721 homes. Of that, 99 percent is converted into sellable products, energy and recycled materials. In other words, only 1 percent of the materials used in the manufacturing operation ends up as waste. And, by using waste materials, their CHP operation requires no fossil fuel.

Biomass is a highly oxygenated fuel, producing much less carbon dioxide during combustion compared to fossil fuels, meaning lower greenhouse gas emissions.

The CHP unit produces about 750 kilowatts of power, or about 65 percent of Young Manufacturing's total electrical needs.

The benefits of Young Manufacturing's CHP system cannot be overstated. Young's website stresses its commitment to sustainability. "Young Manufacturing Co. has been involved for 150 years in sound environmental practices. We have been way ahead of the curve...but we are never satisfied. We continually strive to improve on our excellent environmental achievements."

For more information about Young Manufacturing Company's environmental program, visit http://youngmanufacturing.com/about/green_friendly.

The changing landscapes in Kentucky

By Kenya Stump and Aron Patrick
Department for Energy Development and Independence

LEFT: ***John Lyons, Kentucky's Assistant Secretary of Climate Policy, was moderator during the discussion on greenhouse gas proposed regulations.*** **BELOW:** ***Education and Workforce Development Cabinet's Research and Statistics Director Ron Crouch discussed diminishing employment opportunities related to coal-mining activities.*** Cabinet photos

LEFT: ***Energy and Environment Cabinet Secretary Len Peters provided opening remarks during the 38th Governor's Conference on Energy and the Environment.*** Creative Services photo

Kentucky's landscape is changing—what this means to you may very well depend on your own perspective of the issues at hand. However, Kentucky's *energy* landscape is changing. Last October, attendees of the 38th Governor's Conference on Energy and the Environment listened to 38 speakers from various companies and organizations talk about energy and the integral role it plays in the environmental landscape in Kentucky.

Energy and Environment Cabinet (EEC) Secretary Len Peters, Gatton College of Economics Research Associate Michael Childress, and Kentucky Education and Workforce Development Cabinet Research and Statistics Director Ron Crouch opened the conference by discussing one of the most salient aspects of changing energy landscape—declining coal production.

"We all know the situation in eastern Kentucky—lost coal production and employment," said Peters. "It's a devastating situation for the region, and it has impacts statewide."

Crouch addressed the changing demographic trends in the state, including the emigration from eastern Kentucky due to diminishing employment opportunities in coal mining-related activities. Childress, however, put coal mine employment in context.

"Mining—at 16,000 jobs—is a small share of the Kentucky economy. Kentucky added 350,000 jobs in other sectors since 1990," Childress said.

This year's conference gave participants a chance to engage in two breakout tracks—*Water and Energy Nexus* and *Land Utilization and Resource Conservation*. The idea for these tracks stem from the concept that the energy/environment relationship is important, especially when it comes to how we protect our waterways and water and wastewater infrastructure, to how land utilization and resource conservation help to maintain our energy balance and protect our environment.

Water and Energy Nexus Track

Presentations in this track focused on sustainable waters and stewardship trends in agriculture.

- Staff from the Kentucky Division of Water discussed how technology is helping predict water quality in Kentucky's lakes and how the state is dealing with harmful algal blooms, in addition to innovative nonpoint source programs.
- Louisville Water Co. provided information on how it dealt with last year's chemical spill in West Virginia and its communication plan that kept the public apprized of safe drinking water updates.
- The Kentucky Corn Growers Association presented on sustainable agriculture through the Field to Market Initiative that focuses on meeting the needs of the present while improving the ability of future generations to meet their own needs. It means increasing agricultural productivity; improving the environment and human health; and improving the social and economic well-being of agricultural communities.
- The Kentucky Governor's Office of Agricultural Policy focused its presentation on Kentucky Agricultural Development Fund monies used for 4,800 energy efficiency and renewable energy agricultural community projects totaling more than $420 million.
- Grow Appalachia, a partnership composed of many organizations, addresses food insecurities in Appalachia. The program empowers people to eat healthy through hard work and gardening, restoring the relationship between people and the land. Last year, it worked with more than 25 partner sites in 39

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counties, feeding 19,500 people and growing more than 1 million pounds of food. That translates into 100 jobs in central Appalachia through gardening projects that sold more than $54,000 in produce.

Land Utilization and Resource Conservation Track

This track included presentations on brownfield successes and urban forestry/restoration topics, among others.

- Representatives from Shield Environmental Associates and Smith Management Group discussed one of the most successful programs within the EEC's Department for Environmental Protection—brownfield redevelopment. Brownfields are properties where the expansion or reuse may be complicated by the presence or potential presence of a hazardous substance or contaminant. With the passage of recent legislation and corresponding regulations, Kentucky proactively addressed procedures to reduce barriers relating to liability issues in brownfield property transfers.
- Staff from the Kentucky Division of Forestry told conference participants about the rural community wealth grant that will expand community planning and participation in southeastern Kentucky and encourage forest-based recreation and eco-tourism (read *Planning for the Future* on Pg. 14). The division also introduced a new program where specially trained bloodhounds will help investigate arson cases during wildland fire hazard seasons in Kentucky.

ABOVE: ***Environmental Biologist Garrett Stillings with the Kentucky Division of Water presented information on remote sensing for algal blooms during the Water and Energy Nexus Track.*** **LEFT:** ***Stephanie Bell, Deputy Executive Director of the Kentucky Public Service Commission, spoke about the challenges utilities are facing during the Cyber Security session.*** Cabinet photos

During the second day of the conference, panelists discussed various topics including the U.S. Environmental Protection Agency's (EPA) greenhouse gas proposed regulations, as well as energy innovations in Kentucky communities.

Experts from universities, environmental groups and various industries discussed the implications of the EPA's New Source Performance Standards (NSPS), which limit the emission of carbon dioxide from new and existing power plants.

"The bottom line is—there's going to be lots of litigation," said Carolyn Brown, co-chair of the Environmental and Natural Resources Practice Group, but the mere proposal of carbon dioxide emissions limits by the EPA will have a major impact.

Gabe Pacyniak of Georgetown Climate Center at Georgetown University noted that the U.S. Supreme Court has reaffirmed the EPA's authority to regulate greenhouse gas emissions and that states and power companies can, and already are, achieving emissions reductions in a cost effective manner.

Some panelists, however, stressed the potential negative economic implications of the proposed rules. Dr. Bill Bissett, president of the Kentucky Coal Association, said that the proposed greenhouse gas regulations "are misguided, harmful to our economy and affordable electricity." Bissett went on to stress that these regulations "are a serious concern for Kentucky, our manufacturing and coal industry."

Dr. Rodney Andrews, director of the University of Kentucky Center for Applied Energy Research, agreed that the regulations will have a "huge impact on low-income families across the country but especially in eastern Kentucky," further stating the regulations were "a case of policy getting ahead of technology" and that carbon emissions are a global issue as other countries are increasing fossil fuel use.

According to some panelists, various options are available to Kentucky and electric utilities in the face of these proposed changes. Joe Hoagland, senior vice president at the Tennessee Valley Authority, stressed the importance of having regulatory certainty when making long-term plans for electricity generation infrastructure and emphasized fuel-source diversity from coal, gas and renewables for reliability and costs. Hoagland also said that energy efficiency is a good option to reduce emissions, keep costs low and increase reliability.

David Crews, senior vice president at East Kentucky Power Cooperative, highlighted the work that his member cooperatives are already doing in energy efficiency and promised to continue its work to do more.

Jason Bailey, research and policy director at the Mountain Association for Community and Economic Development, agreed that Kentucky does have significant untapped potential in energy efficiency but also new renewable energy resources and emphasized that Kentucky's energy economy is increasingly at risk even if the state does not act on climate change.

Energy Innovation in Kentucky Communities

The mayors of Greensburg, Glasgow and Berea and the city manager of Benham highlighted innovative initiatives in their cities that improve environmental protection and energy conservation.

- Greensburg is seeing significant cost savings from automated wireless water meter reading technology.
- Glasgow has turned a landfill into a valuable resource through methane capture (read *Landfill to Solar Power* on Pg. 5).
- A 60 kilowatt solar farm and the reuse of wastewater is making Berea an example of environmental stewardship.
- Benham has implemented energy efficiency and on-bill financing to save on energy costs.

The messages from 2014's conference were clear—protecting Kentucky's natural areas, implementing energy-efficient technologies, and innovations in land use practices help not only our environment but also our economy—a key element to the changing landscapes in Kentucky.

For KRMCA, it's all about education

This KY EXCEL member reaps no monetary benefits from its voluntary project, just assurances of a healthier public and environment

By Mary Jo Harrod
Division of Compliance Assistance

When a May 2012 news article reported that Louisville had the worst urban heat island in the country with the fastest growing temperature, outpacing even Atlanta and Phoenix, the Kentucky Ready Mixed Concrete Association (KRMCA) was concerned. A member of KY EXCEL, Kentucky's free environmental leadership program, KRMCA decided to do something about it.

"KY EXCEL is an excellent program that offers organizations the opportunity to begin thinking about minimizing, even if on a small scale, our impact to the environment," says Finley Messick, KRMCA executive director. "KRMCA's opportunity to participate in this voluntary program has afforded us a look into how much we have been able to do with a staff of fewer than five."

Working with other interested and aligned organizations, KRMCA developed an educational campaign for Louisville about the effects of an urban heat island. The campaign, which can be expanded to the rest of the Commonwealth, is entitled "Keep Louisville Cool" and "Keep Kentucky Cool." It includes bumper stickers, websites, informational literature, radio advertisements and billboards.

An urban heat island is a metropolitan area that is significantly warmer than surrounding rural areas. It can be created by too many dark roofs and parking lots and too few trees and man-made reflective surfaces. The Centers for Disease Control and Prevention says excessive heat claims more lives in the U.S. each year than hurricanes, lightning, floods, tornadoes and earthquakes combined. Compared to rural areas, residents of cities experience higher rates of heat-related illness, such as heat stroke, organ damage, physical discomfort and death.

Besides the health issues, urban heat islands require greater amounts of energy to cool buildings and illuminate streets. Not only is using more energy costly, but it is harmful to the environment.

Urban heat islands can be minimized in cities by using trees in landscaping, and pervious concrete and manmade reflective surfaces in areas such as parking lots. The campaign suggested using native, canopy-producing trees and plants, since green roofs and cool roofs are also beneficial in mitigating the heat island effect. Concrete is naturally brighter and more reflective than other pavement surfaces, requiring less energy to illuminate comparable areas. While reflective pavements keep areas cooler, an added benefit to the environment is that they provide for cooler stormwater runoff. Through the use of pervious concrete, runoff can also be reduced, allowing filtered stormwater to percolate back into the ground, recharging the aquifer with fewer pollutants. Using these suggestions, less energy is needed to heat and cool the buildings and less light is needed to illuminate the pavements.

"Since this project is for public education, no payback is anticipated," says Brett Ruffing, KRMCA technology and education specialist.

To enhance the learning experience for school audiences, an infrared gun was purchased to help demonstrate the difference in temperature between various pavement materials. Billboard ads and radio spots for the campaign in Louisville,

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ABOVE and CENTER: ***The campaign provides educational demonstrations on the differences between temperatures in paving materials by using an infrared gun. Keep Kentucky Cool logo.*** Images by KRMCA

Sustainable Spirits summits yield best practices document

By Mary Jo Harrod
Division of Compliance Assistance

The bourbon industry is booming in Kentucky, with the number of distillers tripling over the past two years, according to an economic impact survey performed by the University of Louisville at the request of the Kentucky Distillers' Association. These distilleries are not only making a big impact on Kentucky's employment and economy, but they're also hoping to make an impact on the environment—in a good way.

Members of the Kentucky Distillers Association and others in the state's distilling industry have been meeting periodically for the past few years to discuss environmental issues at Kentucky's Sustainable Spirits summits hosted by the Department for Environmental Protection's Division of Compliance Assistance. The industry is looking to lead the green movement by sharing ideas and information about topics like renewable energy, recycling and greenhouse gas regulations.

The latest summit was held at Jim Beam-Clermont this summer where a final draft document showcasing best management and sustainable practices by Kentucky's spirits industry was presented. "Sustainable Spirits: A Look into Sustainable Practices of Kentucky's Distilleries and Breweries" highlights such examples as the major recycling efforts at Heaven Hill Distilleries where 771 tons of materials were recycled in 2013; the decision to use wood waste (biomass) in Wild Turkey's boiler, which is more sustainable since the product can be regenerated and would otherwise be wasted; corn used at Woodford Reserve is locally sourced, limiting transportation of grain and reducing air pollution emitted from trucks; a wetland created by Maker's Mark near Hardin's Creek acts as a natural wastewater system to filter stormwater runoff from the watershed; and the new American Stillhouse Visitor Center at Jim Beam-Clermont is LEED-gold certified and includes geothermal heating and cooling, low-flow toilets and motion sensors on the sinks in the restrooms.

The document can be viewed at http://tinyurl.com/q27t69b. Several of the summit participants are members of KY EXCEL, Kentucky's free environmental leadership program. Anyone in Kentucky, including individuals, businesses, schools and organizations, can join. Members are not only doing projects of their choosing that protect the environment, but they are noticing substantial monetary savings and can network with like-minded members. For information about the KY EXCEL program, call 1-800-926-8111 or visit http://dca.ky.gov/kyexcel/.

Landfill to solar power

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president directed in 2012 that the armed forces achieve no less than 25 percent of energy consumption from renewable sources by 2025, with the goal of 3 gigawatts of renewable energy by the same date.

For the U.S. defense complex and national security, having assured access to reliable supplies of energy is important in order to meet military operational needs. For Fort Campbell, having a close relationship with PRECC is essential to meeting the president's mandate. In fact, PRECC has a long history of working with energy savings performance contracts in a variety of projects; however, renewable energy is the newest and most unique project. Since 2005, PRECC has financed more than $27 million in energy savings projects at Fort Campbell, realizing an energy savings of approximately 15 percent at the post since the partnership began.

Building on this long history, PRECC applied for granting funding for the 5MW solar arrays from DEDI in 2012. As a result of the application, PRECC received

Solar panel photograph courtesy of iStock.

$3.1 million in funding toward 1.3 MW with PRECC financing ~0.6 MW. Fort Campbell will then use a Power Purchase Agreement for the remaining 3.1 MW. In total, more than $19 million will be invested into the solar installation. In addition, the U.S. Department of Energy just issued $800,000 in support of the project.

"This is an excellent opportunity for the Army to leverage both a Utility Energy Services Contract and a Power Purchase Agreement to deliver a system that will generate enough energy to power 463 homes, while avoiding 4.7 million tons per year of carbon dioxide emission," said James R. McCoy Jr., Fort Campbell's chief of business operations and integrations division.

The success of the Fort Campbell project can be attributed to leveraging a diverse set of partnerships and funding along with the ability to reuse property for the benefit of the environment and for energy security of the base.

In addition to the number of homes that can be powered from the generated electricity, the reduction in CO_2 emissions is equivalent to planting 14,121 trees or removing more than 1,000 cars from the roadway. Fort Campbell is also expected to receive close to $500,000 in energy savings annually, not to mention the assurance that it is one step closer to meeting its goals of energy security.

Winter's revelations at Vernon-Douglas SNP

By Joyce Bender
Kentucky State Nature Preserves Commission

Vernon-Douglas State Nature Preserve (SNP) hides its power under a leafy cover. Walking the trail in the summer months is quite different than hiking the same path in the winter. The grandeur of the spreading crowns towering so high above and the substantial trunks that command your attention are subdued by the shorter distance that your eyes can see when they are distracted by leaf-filled branches and shrubby mid-story growth. To really get to know a preserve, you must hike it in the winter.

Walking the trail at Vernon-Douglas in January reveals the forest and the topography in a stark, immediate manner. The architecture of the landscape is exposed in the strength of trunks and grace of arching boughs. The ridgeline and steep slopes stand out in graphic relief above the meandering creek, more so if lightly dusted with snow. The landscape has the power to awe us with its austere beauty and humble us with its scale.

This Hardin County treasure protects 730 acres of rugged knobs and hollows and is one of the finest examples of an acid mesophytic forest (dominated by sugar maple, beech and tulip poplar) known in Kentucky. The hills that rise around Hall Hollow protect and sustain some of the most mature forest in the Knobs region.

Thanks to the vision of the former owners, siblings Eleanor and Ollie Douglas, much of this area has been left virtually untouched for the last 120 years. Preservation of this land was the goal of the Douglas family, who had owned the land since the early 1900s. They intended that the forest in Hall Hollow would never be logged. They desired to restore the farmed valley in Burns Hollow to forest. Throughout the 1950s and 1960s, Ollie Douglas applied a number of conservation practices on the land including erosion control (with kudzu!) and pine plantings in the old agricultural fields. In 1972, the Douglas family donated their land to The National Audubon Society. It maintained the area

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BACKGROUND: Sunlight filtering through the tree canopy in Hall Hollow. Photo by Preserve Monitor Joel Thomas
INSET: Vernon-Douglas field trip. D. Payne photo

Planning for the future

Kentucky communities utilize grants to enhance greenspace

By Sarah Gracey
Division of Forestry

A solid plan is the best first step in setting out to achieve goals. However, for any community, the thought of bringing together multiple groups with varied interests can be daunting. Still, having a plan, especially for a community's natural resources, sets forth a solid foundation for reaching the final target.

Six perfect examples of executing such a plan began three years ago. It all started when the Kentucky Division of Forestry (KDF) and the Virginia Department of Forestry received a grant from the U.S. Department of Agriculture Forest Service for a project titled *Increasing Rural Community Wealth and Environmental Health in Southwest Virginia and Southeastern Kentucky Coal Counties (RCW)*. The project focuses on expanding community participation in greenspace planning and in developing plans and long-term strategies that protect those resources and encourage forest-based recreation and eco-tourism.

In order to select communities to participate in the RCW greenspace project, KDF initiated an application selection process within the area development districts of Big Sandy, Cumberland Valley and Kentucky River. Following onsite visits, KDF selected the communities of Elkhorn City, Hazard, Jenkins, Paintsville and Wayland, as well as the Annville Institute, to participate in the project. KDF also partnered with Virginia Tech's Community Design Assistance Center (CDAC) to develop landscape and traditional architecture plans, while also involving each community in the planning process for maximizing its greenspace.

Initial meetings were held at the institute and in each community where various groups represented by municipal employees, churches, local nonprofits, civic organizations, law enforcement and Future Farmers of America discussed their vision for their community's natural resources.

"The beauty of bringing together these different groups is that we can create a collective voice for a project. This really shows what the community wants as a whole and gives them a better opportunity to go after grant funding," said Lara Browning, project manager at CDAC.

Alongside the initial meetings, soil samples and street and building measurements, maps and other resource information were collected. At a second meeting, CDAC presented conceptual design plans. Citizens were then able to give their opinion on specific details of the plans—what they liked, what they didn't like or the opportunity to offer other options. Never was there a case where one design was simply accepted. CDAC was able to make revisions to the plans, making the final design a collaborative effort among the community members.

Seeing is Believing

Finally last year, each of the communities and the institute were able to start implementing at least one piece of their greenspace plan. For some, this meant using their plan when applying for various grants or public/private funding, which some grant programs

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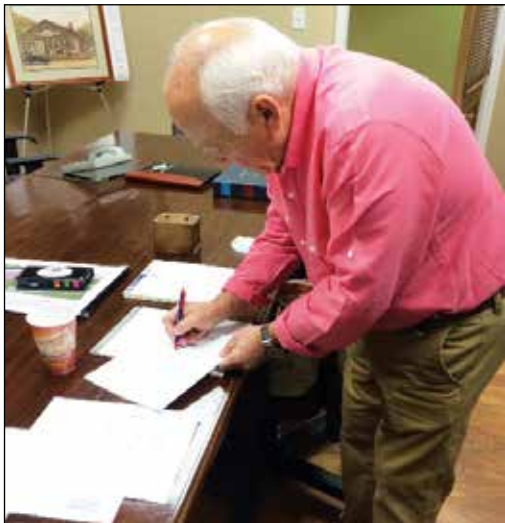

TOP to BOTTOM: ***Mayor Jerry Fultz of Wayland and Regina Hall of Big Sandy Area Development District discuss plans for a future walkway to access a roadside park. Jenny Williams of Pathfinders announces the $50,000 ArtsPlace grant that will be used for the River Arts Greenway Project in Hazard. CDAC employee Harley Walker (right) discusses the conceptual plan with a resident of Paintsville. Jenkins Mayor G.C. Kincer signs the memorandum of agreement for a Recreational Trails Program grant.*** Photos by Sarah Gracey

Winter's revelations at Vernon-Douglas SNP

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as a nature sanctuary before donating it to the Kentucky State Nature Preserves Commission, which dedicated it as a state nature preserve in 1992.

The 3.75-mile hiking trail starts near the mouth of Burns Hollow. This broad hollow had large infestations of kudzu, which the commission spent nearly 20 years eradicating. The formerly farmed valley is now filling in with young forest. The trail winds its way upward to the ridge, passing impressive-sized oaks and hickories. The trail diverges at the ridge—one side of the loop descends a side slope and passes through the bottom of the rich, north-facing Hall Hollow. The other side continues along the ridge above and around Hall Hollow. Long, dramatic views of the curving ridge and the steep slopes to the valley below accompany the winter ridgetop hiker. The ridgetop trees are those typical of well-drained drier forest soils, including chestnut oak, black oak and pignut hickory. Before the ridge top trail descends, a short spur leads hikers to a narrow point known as "the Pinnacle." When the leaves are off, it provides a bird's eye view of the Younger Creek valley across the Bluegrass Parkway.

Hikers may find reasons to linger in Hall Hollow in every season. The forest's undisturbed floor provides the best spring wildflower display on the nature preserve, especially along the creek sides. A quiet hiker may glimpse deer or turkey foraging for beech nuts and acorns. The large trees can leave one contemplative in the winter or grateful for the cool shade in summer.

The preserve is open daily for passive recreation from sunrise to sunset. Hiking, nature study and photography are encouraged, but please stay on the trail and leave all living and nonliving materials as you find them. Horses, pets, bicycles, hunting, fishing, camp fires and motorized vehicles are not permitted on the preserve. Help protect Kentucky's natural heritage by packing out all trash and traveling only by foot.

Residential wood heating getting cleaner

Continued from Page 3

in an EPA voluntary program that encourages manufacturers to make cleaner-burning fireplaces and retrofits available for consumers.

Q: If I want to buy or sell a used wood-burning appliance, can I?
DC: *This rule does not affect resale of used wood stoves and heaters.*

Q: Some ads are saying the rules would prohibit the sale of current models as early as next spring. Is that true?
DC: *The NSPS will reflect the significant improvements in technology since 1988, and as a result, these heaters are expected to be much cleaner and more efficient. EPA proposed a 6-month "sold at retail" provision for adjustable burn-rate wood heaters, single burn-rate heaters/stoves, and pellet heaters/stoves that were manufactured before the final rule is in effect, but not yet sold. We received a number of comments on this issue at proposal, and we're considering them carefully as we develop the final rule.*

Q: How many wood burning appliances are there in the U.S.?
DC: *According to EPA's 2011 National Emissions Inventory (NEI - Version 1), the most recent information we have, wood stoves and fireplace inserts are used in about 8 million homes in the U.S. Nearly 900,000 pellet stoves are in use. Approximately 241,000 outdoor hydronic heaters and 242,000 indoor wood-fired furnaces operate in the U.S. The masonry heater industry is relatively small, and we don't have production numbers for these appliances. EPA estimates there are 17.5 million wood-burning fireplaces in use in the U.S. (Source: U.S. EPA Residential Wood Combustion Tool).*

Q: How many wood burning appliances are there in Kentucky?
DC: *According to the same EPA inventory (2011 NEI), there are almost a half million wood burning appliances in Kentucky.*

Q: How much particle pollution is estimated to come from wood burning appliances in the U.S.?
DC: *In 2011 (from EPA's NEI), about 390,000 tons of fine particle pollution came from wood burning appliances. That amount is about 15 percent of total fine particle pollution coming from all sources.*

Q: What can be done about particle pollution from existing wood burning appliances?
EPA has a number of tools available to help state and local governments address particle pollution from existing heaters, including "Strategies for Reducing Residential Wood Smoke." This document was issued by EPA's Burn Wise program, and it covers options for local regulations, voluntary programs, funding mechanisms and best burn practices - all of which can help reduce particle pollution from existing wood-burning appliances. This document is available at http://www.epa.gov/burnwise/strategies.html
Wood stove users should burn wood wisely and operate their appliances according to the owner's manual. Tips on best burn practices can be found on EPA's website at http://www.epa.gov/burnwise/bestburn.html

Q: When will the rules be finalized?
DC: *EPA is under a consent decree deadline to issue the final rule by Feb. 3, 2015.*

Q: When will the rules go into effect?
DC: *The rules will be effective 60 days after publication in the Federal Register.*

Planning for the future

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require. But, even when they don't, portions of the plan have still been used.

"There is nothing that we do where we don't reference the whole CDAC plan or part of it," said Jill Orthman Hatch, grants manager for the city of Jenkins. Jenkins used their plan to secure an $88,700 Recreational Trails Program grant that was designed as part of their CDAC project. When the trail is completed, three aspects of Jenkins will be highlighted—adventure, history and coal. An additional $18,400 grant from Tour Southeastern Kentucky will be used to construct signs, and another small grant will address bike issues for the new trails.

The rehabilitation of Lincoln Hall.
Photo by Sarah Gracey

Hazard is actively moving towards change, with groups working to enhance the local economy, improve health and make it a better place to live. "We want to create a community where people will want to come and live, and those that live here will want to stay here," says Jenny Williams of Pathfinders. Hazard is the recipient of a $50,000 ArtPlace grant that will be used to begin the River Arts Greenway construction project in downtown Hazard. With CDAC's help and renderings, Williams and others were able to envision places that they see every day in an exciting new way. "I had never once stepped foot on the pathway under the city parking garage until I walked there with CDAC," said Williams, "Now, look at these drawings and the plans we have for our greenway, and it makes us see the true potential we have."

Mayor Jerry Fultz of Wayland has big plans for his tiny town. "We have 427 residents. No wait, we had a family from Ohio move in last month—we are at 431," Fultz said with a smile. Wayland has received a $20,225 grant for a walking trail outlined in their plan and has applied for a grant to complete a softball field. Fultz also plans to apply for a Kentucky Colonel grant for a 100-percent handicap accessible playground. "This plan enables me to sell an idea and gets me in doors. When I say that I have something on paper, it gives me a leg up," said Fultz.

The 123-acre Annville Institute in Jackson County serves as home for several nonprofit organizations, as well as a community center for the county. "Having this plan has enabled us to reach out to the community and supporters and enable them to see ideas," said Jake Moss, executive director of the institute. "I've used the greenspace plan in several grant applications as well as the basis for a local Eagle Scout project." The institute has secured two grants totaling $250,000 that will work toward the rehabilitation of Lincoln Hall, which will serve as a community arts center and also a $45,000 Steele Reese grant that will allow their gym to be accessible to more members of the community.

Elkhorn City is beginning work on their CDAC-inspired community center, while Paintsville is working on signage directing people to and from the new Dawkins Line Rail Trail.

With the help of these grants and assistance from CDAC, there is great potential for a boost from local eco-tourism in each of these communities. In fact, they are all in the process of being designated as Kentucky Trail Town communities.

"The planning efforts of CDAC are paying off, not only in dollars secured for these community projects, but in bringing communities together as a whole and having an impact on the region," said Browning. "It is exciting to see these communities implementing their plans and we look forward to seeing what they accomplish in the future."

For KRMCA, it's all about education

Continued from Page 11

Lexington, northern Kentucky and Bowling Green cost approximately $15,000 and reached 70 percent of the state's population. Other participating organizations provided input to the website, which has received more than 100,000 visits.

"We felt this campaign was important because it concerned the environment and public health," says Ruffing. "But one of the challenges was being sure there were enough funds available to do the educating."

Ruffing suggests planning ahead before starting an educational project of this type. Have an idea of the amount of money that will be required and the best way to reach your target audience.

The campaign goal was achieved by creating a greater awareness and understanding of the urban heat island effect. It provided ideas about how to change the phenomenon, leading to better city planning to keep cities cooler. City planners can map out proposed areas and include the use of trees, grass and other elements that minimize the urban heat island effect. Planners may also use materials, like concrete, to reflect light; minimize rapid temperature growth and reduce the amount of overhead lighting required. Using these options will not only minimize the urban heat island effect, but will save energy and money, too.

"Do things for the environment because they're the right things to do—for the health of the population and community and to conserve resources for future generations," Ruffing says. "Don't think about your own payback. Think about the betterment of the community. Each little bit you do counts."

To learn more about the campaign, visit www.KeepKYCool.com. To become a KY EXCEL member, call 1-800-926-8111 or visit http://dca.ky.gov/kyexcel/.

New KY EXCEL members:

- Fayette County Public Schools—Fayette County (Advocate)
- Asahi Bluegrass Forge—Madison County (Partner)

Discover the cover

It's not your grandfather's cover crop

LEFT: ***A variety of plants is included in this cover crop mixture.*** **ABOVE:** ***Wiley Brown inspects his crop.*** Photos by Jamie Ponder

By Jamie Johnson Ponder
Division of Conservation

In the wake of renewed resurgence of dust storm activity in the west and unpredictable weather patterns occurring all across the country, it has become crucially important to educate landowners in the importance of healthy soils and how to achieve them. Many advances have been made in the field of soil health systems, and new methods of choosing the right cover crop blend at appropriate planting times allow soils to keep improving year after year.

Soil health is measured by biological, physical and chemical properties making it inherently important to farm in a way that addresses each of these properties. History proves that tilling destroys the structure of the soil; leaving the soil uncovered with no live growing roots destroys microbial habitat, reducing the amount of available nutrients and diminishing biological and chemical properties.

One of the best ways to reverse this process and restore healthy soil function is through the implementation of soil health systems, which include no-till cropping and cover crop seeding. Some of the benefits of soil health systems include better water infiltration, improved permeability, greater pore space, increased water holding capacity, better microbial habitat, greater nutrient cycling, increased soil organic matter, and reduction or possible elimination of the need for commercial fertilizer and chemical applications.

This method of production hinges on the single premise of keeping a living root in the ground at all times and is a departure from the standard monoculture cover cropping systems common in the past, rather relying on multiple species working synergistically to correct a multitude of soil health problems. At planting time, cover crops are not removed from the field, but rolled down and left as a green fertilize for the crop. What's happening under the soil surface is just as important.

"The key to soil health improvement is implementing the five principles of soil health—no-till, maximize organic matter/residues on and in the soil surface, keep a live root growing throughout the year, maximize plant diversity through crop rotations and cover crop mixtures, and apply animal waste or high-quality compost if available," said John Graham, state soil health specialist with the Natural Resources Conservation Service.

As part of a five-year trial, Wiley and Terrie Brown implemented cover crops on a five-acre soil health research plot on their Knox County farm in 2012. It included an eight-way mixture of pearl millet, proso millet, sorghum, black soybean, sunflower, radish, Austrian winter peas and corn. It was followed by a fall planting of cereal rye, crimson clover, Austrian winter peas and daikon radish. In the spring of 2013, the cover crop was rolled down and sprayed with a single application of glyphosate followed by no-till seeding of corn. The plot flooded shortly after seeding, which affected germination rates. However, with no added fertilizer or chemical application the Browns realized an abundant crop that was harvested for silage and followed by a fall cover crop planting of daikon radish, Austrian winter peas, cereal rye and crimson clover. When implemented properly, this method of planting can eventually negate the need for commercial fertilizer and chemical weed control on crop ground.

The Browns, who spend more than $80,000 a year on commercial fertilizer, stated, "last year we didn't add any commercial fertilizer to the soil health research plot and we had a tremendous yield." The five-acre plot brought in 300 bushels of soybeans, significantly beating the national average of 40 bushels per acre.

To learn more about soil health systems, including alternative cover crops and no-till visit http://conservation.ky.gov or www.nrcs.usda.gov.

Eyesore to restore

Sharpsburg historical facility transformed into community center

By Mary Jo Harrod
Division of Compliance Assistance

ABOVE: ***The old gymnasium littered with wood, junkyard and automotive parts was an eyesore.*** **BELOW:** ***The new community center utilizes beautiful architectural details from 1910.*** Photos courtesy of the city of Sharpsburg

Established in 1814, Sharpsburg, Ky., in Bath County, has a population in the city limits of about 400. In 1910, Sharpsburg School was built to be a fireproof replacement for several one-room school buildings in the area. In 1936, a grant from the Works Progress Administration (WPA) was used to construct a gym for the school using native materials in a long-lasting architectural style, known as WPA Rustic Architecture, widely used during that time on gymnasiums, amphitheaters and lodges.

In 2002, when the school building was deemed unsafe, it was demolished. The gym, with its 18-inch thick stone masonry walls and metal structure, later was used as a junkyard and farm implements store. Finally, the gym's roof and organic materials decomposed and littered the crawl space of the building, becoming a community eyesore.

When the owner of the property offered to donate the old gym and school grounds to the city, Mayor Dorothy Clemons and other city officials knew they needed assistance and advice on how to proceed.

"We called the Kentucky Brownfield Redevelopment Program for advice," said Mayor Clemons. "A staff member talked with us and did an assessment.

"Later, we brought in a bulldozer to clear the brush and undergrowth from the inside. During this process, contractors removed kitchen appliances, tractor parts, car parts, wood flooring, roofing and more than 500 old tires that were found in the ground," she said.

The city planned to renovate the property and provide a community center for the people of Sharpsburg. Area residents realized the need for a community center with meeting spaces, a library, classroom and exercise space, so they worked to overcome the financial hurdles. To raise funds, Friends of the Sharpsburg Community Center sold engraved bricks for $100. With assistance from the Gateway Area Development District Funding Administration, the city received grant funding from the U.S. Department of Agriculture Rural Development's Community Facility Grant and Loan Program, Appalachian Regional Commission and Kentucky Department for Local Government's Block Grant Program.

The city dealt with many ups and downs throughout the project. First, it was given 30 days to raise $40,000 before an architect could be hired. Thankfully, Friends of the Sharpsburg Community Center came through and raised $45,000. Then, the city went through the bidding process three times. Each time bids came in higher than city officials felt they could afford, they would eliminate some line items from the plans.

"For anyone thinking about doing a project such as this, look at the big picture," Clemons advises. "What do you want? What can you live without? Have your finances stable and in order before the project kicks off because you will end up having to dip into your funds. Never give up."

Due to the length of time it took from the initial stages to completion, some citizens felt the project would never become a reality. However, with persistence, Sharpsburg's community center was completed, making the community proud.

The city partnered with Maysville Technical College and the Bath County Extension Agency to hold educational workshops in the classrooms. Area residents keep the facility busy with wedding receptions, family reunions, birthday parties and other events. A branch of the Bath County Memorial Library occupies a portion of the building, making it more convenient to area residents than the Owingsville library nine miles away.

Sharpsburg took a site that played a major role in its history and transformed it from a blighted property to an asset that is once again a vibrant part of the community. For more information about the Kentucky Brownfield Redevelopment Program, email herb.petitjean@ky.gov or visit http://dca.ky.gov/brownfields/pages/default.aspx

Awards

Contest highlights the benefits of Kentucky's forestland

By Jennifer L. Turner
Division of Forestry

Southeast Kentucky is an area dominated by forests. According to the Kentucky Division of Forestry's (KDF) 2011 forest inventory, southeastern counties are densely covered with 65 percent to nearly 80 percent forests. In order to provide high school students with a better understanding of the social and economic benefits of forestlands, the KDF, University of Kentucky Cooperative Extension Service, STIHL and the Kentucky Forest Industries Association sponsored the Southeast Kentucky Forestry Contest, which took place in September 2014. It is the fifth year for the contest.

Twelve co-ed teams, each with 20 high school students, came from Bell, Breathitt, Estill, Jackson, Knott, Knox, Laurel, Lee, McCreary and Whitley counties to participate and be tested on general forestry knowledge, tree species identification, forestry tools, wildland firefighting equipment and wildlife.

Whitley County High School took first place for the fifth year in a row, with McCreary County High School coming in second, and Lee County High School placing third.

"For us, it is the most highly anticipated contest that we do all year," said Brian Prewitt, agriculture teacher/FFA advisor for Whitley County High School. "The amount of learning that our students obtain through his contest is amazing. Our students are self-motivated through the tough competition and the desire to make the team here at school, and then carry on the tradition in the competition."

During the timber stand improvement portion of the competition, students are given a short narrative about a landowner's objectives for 10 trees on his property. The teams are then asked to identify the species and determine the best way to manage them to achieve the landowner's goals. Teams decide whether to leave the trees, cut them down, or kill some and leave them in place.

In this scenario, students left trees standing because they were either desirable for wildlife, a benefit to a threatened or endangered species, aesthetics or a seed tree providing for the next generation of forests. Killing a tree and leaving it to stand in the woodland provided potential habitat for cavity dwelling animals. If a tree had financial value, students recommended harvesting the tree for commercial sale.

To take a tree's measurements, students used a common forester tool—the Biltmore stick—to measure the diameter of a tree at breast height. To determine board feet in logs of a standing tree, students paced off 66 feet from the base of the tree and combined it with the tree's diameter. By using the "log scale" side of the Biltmore stick, students estimate board feet in logs on the ground. This activity helps students learn how a forester estimates a tree's volume and how a sawmill measures trees in the log yard.

The highlight of the forestry contest is the cross-cut and chainsaw competitions. For the cross-cut events, teams are timed on how fast they can cut through an 8-inch by 8-inch square cant (squared up piece of log).

For the chainsaw competition, teams with eight students make one cut per student through the cant. Cut times for all members are added together and the team with the lowest time wins.

Planning for the 2015 Southeast Kentucky Forestry Contest is underway. Anyone wishing to participate should contact KDF forester Michael Froelich at 606-594-4687 or Bell County extension agent Stacy White at 606-337-2376.

TOP LEFT to BOTTOM: ***Whitley County High School's FFA Chapter students won the overall competition for the fifth consecutive year. A student receives instruction before the chainsaw event. A two-person female team competes in the cross-cut event.*** Photos by Michael Froelich, KDF southeast region forester

Photo courtesy of Natural Resources Conservation Service

Peerys win Aldo Leopold Conservation Award

By Johnna McHugh
Division of Conservation

Jerry and Valarie Peery of Springhill Farms in Hickman County were recently recognized as the 2014 winners of the Leopold Conservation Award in Kentucky. The Peery family received $10,000 and a crystal depicting renowned conservationist Aldo Leopold at the American Farmland Trust National Convention held in October in Lexington. The award is presented by the nonprofit Sand County Foundation that works with private landowners to improve habitat on their property.

"The Peery family's acceptance speech for the award was testimony to a lifetime of improving the economic and environmental sustainability of their land. As they increased their landholdings, they implemented more and more sustainable environmental practices," said Nancy Cox, president of the Kentucky Ag Council. "Their farm is emblematic of Leopold's belief that productivity is best when the environment is a prime focus."

Jerry Peery has been farming since he graduated from high school in 1957. Throughout the years, his Springhill Farms row crop operation has grown to encompass 1,600 acres of cropland, 200 acres of unplanted land and 300 acres of rented farmland. Best management practices are used throughout this acreage to ensure that the natural resources of their property are protected to the best of their ability.

Springhill Farms has been participating in no-till farming on portions of the farm for more than 40 years. They have been no-till planting all crops since 1985. After they harvest their row crops, the Peerys use a cover crop to protect their land from erosion, while also adding nutrients and organic matter into the soil. They set a good example by planting different varieties and mixtures of cover crops to optimize their land.

The Peerys also help protect water quality by including grass waterways and filter strips to control erosion from water and filter runoff before rainwater reaches nearby surface water. These best management practices, and others, protect the soil and water on their farm, as well as reduce the resources required to get their fields ready for production.

"We believe it is important to be good stewards and caretakers of the land so we can leave a legacy for our children, grandchildren, and the generations to come while protecting the vital natural resources that we depend on to feed the world," said Peery.

Two other landowners were recognized as finalists for the award. The Bowling family of The Old Homeplace Farm in Oneida use best management conservation techniques as they work on their cow-calf operation. Charles Williams of West Wind Farm in Munfordville has installed conservation practices on his tree farm. Both of these finalists will be included in the selection for the Leopold award next year.

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Seedling nurseries: growing trees for healthy and productive forests

Chinkapin Oak. Courtesy of the U.S. Forest Service

Chinkapin oak is the limestone equivalent of the chestnut oak. Both are from the white oak genus and are similar in size, growth and use as a wildlife tree; however, chinkapin prefers the limestone soil of the western and central part of the state. Chestnut oak prefers the sandstone soil of northern and eastern Kentucky.

Seedlings are available from early fall to early spring from the Division of Forestry's nurseries. Orders are shipped at your request for planting projects during the dormant period throughout the winter. To obtain an order form, visit http://forestry.ky.gov/statenurseriesandtreeseedlings/Pages/default.aspx or call 1-800-866-0555.

Just the Facts: Chinkapin Oak (Quercus muehlenbergii) and Chestnut Oak (Quercus Montana)

- ***Growth:*** Both trees have alternate, simple leaves, dark, shiny green on top and pale green below. The chinkapin oak has much smaller acorns than the chestnut oak. Both trees grow about 60 to 70 feet. The chestnut oak is readily identified by its massively ridged dark gray-brown bark, the thickest of any eastern North American oak. The chinkapin oak has light ash-gray and somewhat peeling bark.
- ***Range:*** Generally, chinkapin oaks are found in the same range as the chestnut oak. They are native to the eastern U.S. The chestnut oak is one of the most important ridgetop trees from southern Maine southwest to central Mississippi. The chinkapin oak can be found further south and as far west as the eastern portion of Texas and Arkansas.
- ***Wildlife Uses:*** The chinkapin oak is especially known for its sweet and palatable acorns. The nuts contained inside of the thin shell are among the sweetest of any oak, with an excellent taste even when eaten raw, providing an excellent source of food for both wildlife and people. The chestnut oak acorn is also eaten by many species of wildlife.
- ***Tree Trivia:*** The state champion chinkapin oak is in Harrison County. It is also a national champion for this species with a circumference of 311 inches and 76 feet tall. The state chestnut oak is in Johnson County. It has a circumference of 205 inches and is 98 feet tall.